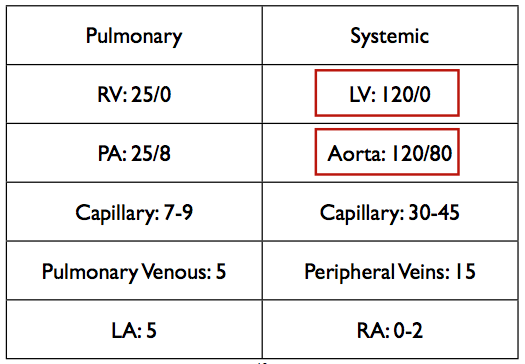
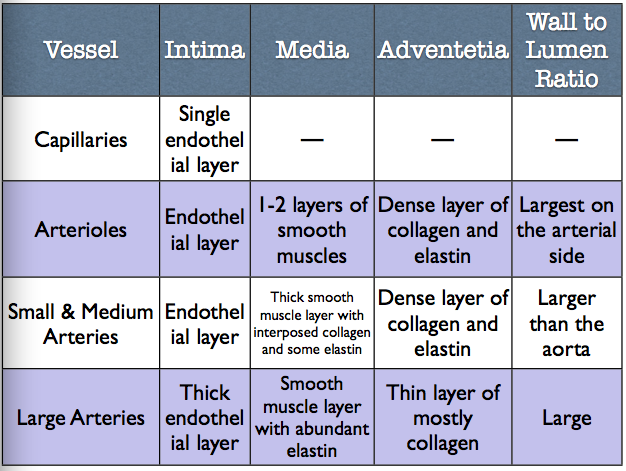


* Collagen fibers prevent rupture of arteries under pressure (mainly type III)
* VSMC are most prevalent in arterioles and least prevalent in large arteries
* VSMC is the site of active control of the vasculature (ANS)

**COMPONENTS OF VASCULAR WALL**

1. Tunica intima
2. Tunica media
   1. In elastic artery—high% of elastic fibers w/ a series of concentrically arranged, perforated elastic laminae—the laminar arrangement allows it to have distensibility in order to accommodate blood
      1. Everything with distensibility has RECOIL
   2. Collagen in the aorta has no ordered arrangement at low pressure but at high pressures it is arranged circumferentially to limits its distensibility—if defective collagen can have an aneurysm.
      1. Marfan’s Sx: Defective fibrillin1= defective collagen= prone to aneurysms
      2. Rubberman Sx= Ehlers Danlos Sx type IV
   3. In a muscular artery the media is predominantly SMC and a larger tunica adventitia
   4. Tunica media is thinner in VEINS!
3. Tunica externa= adventitia (primarily collagen)

* Muscular arteries and arterioles are the ones that really affect TPR
* Aorta has mostly elastic fibers (as do all of the large arteries)
* Arterioles have small lumen but large tunica media while aorta has big lumen and tunica media
* Composition of veins and arteries aren’t that different (which makes them able to be used in bypasses)
  + The difference between arteries and veins is their shape. At normal pressure ranges of veins (<25 mm Hg) they are collapsed and they are ellipsoidal. At higher pressures veins can ↑ their CSA (not their circumference) to allow for ↑ accommodation of blood. At higher pressures like at MAP veins behave just like arteries due to their similar composition.
  + Compliance is how much volume an artery will accept if you ↑ P🡪 large arteries have limited compliance as opposed to large veins: a function of shape rather than structure
  + Small changes in pressure in veins results in a huge change in volume b/c they are collapsed (their shape) at normal Pressure
* Flow in the large arteries is not linear because of their elasticity which ↑ circumference 🡪 ↑ radius 🡪 ↓ resistance as P ↑
* 



* The heart is an intermittent pump yet the flow to the periphery is continuous—THIS IS DO TO AORTIC RECOIL (acts like a second pump)
  + Fluid pushes on air and air pushes back on fluid
  + Aortic stretch during systole causes aortic recoil during diastole
    - Aorta also limits distensibility during systole b/c of collagen so it buffers the rise in systolic BP
  + If aorta loses compliance/elasticity the flow isn’t continuous anymore🡪 older patients have ↑ fibrosis (noncompliant aorta)--↑ collagen🡪 ↓ elasticity🡪 ↑ in systolic P 🡪 ↓ in diastolic P
    - Which means ↑ in pulse pressure (Systolic- diastolic) so heart is working harder
* Gravity has no effect on MAP (remember it is the change in P not the absolute pressure that matter)
  + Artery while laying is 100 and while standing is 190
  + Vein will laying is 10 and while standing is 100
    - Both have a difference of 90
    - Only difference is at ↑ P veins have increased compliance compared to arteries and tend to pool blood (↑ in this while standing due to ↑ P)
* The distention of the proximal aorta at the start of ejection travels down the wall of the arterial tree as a pulse wave (think of aorta as a string—with lots of compliance=more slack—the wave takes longer to travel; with ↓ distensibilty the wave will travel faster because of less slack)
  + PULSE WAVE VELOCITY—gold standard to measure aortic stiffness
  + ↑ In PWV if aorta has ↓ compliance

Function of endothelium (lines all the vessels)

* Thrombo-regulatory: keeps blood fluid
  + eicosanoids: PGI2
  + NO (gas)
  + Endothelin (prothrombotic)
  + Loss of endothelium leads to ↑ clotting
* Anti-inflammatory: prevents movement of anti-inflammatory WBC
  + NO (gas)
  + Eicosanoids: PGI2, Epoxides
* Vasodilation (↓ R)
  + Endothelium derived relaxing factor (EDRF)—NO, PGI2
  + Endothelium derived hyperpolarizing factor (EDHF)—Epoxides, H2O2?